REMARKS

Prior to entry of this amendment, claims 1-18 were pending. By this amendment, the title and claims 1-4, 6, 13 and 14 are amended. The subject matter of the amendments to the title and claims 1-4, 6, 13 and 14 is fully supported in the specification as filed, and thus, no new matter is added. Claims 1-18 are presented for further prosecution on the merits.

Favorable reconsideration of this application is respectfully requested in view of the foregoing amendments and following remarks.

In the Office Action mailed July 9, 2004, claims 2, 3, 13 and 14 are objected to for informalities and claim 3 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Claim 1 has been amended responsive to the objection so as to provide proper antecedent basis, and claim 3 has been amended responsive to the § 112 rejection. If any additional amendment is necessary to overcome this objection and rejection, the Examiner is requested to contact the Applicants' undersigned representative.

Claims 1-5, 13 and 15-17 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the applicants admitted prior art (hereinafter "AAPA") in view of Lee et al. (E.U. 0 932 302 A2, hereinafter "Lee") and further in view of Watanabe (U.S. Patent No. 6,522,365, hereinafter "Watanabe"). Claims 6-12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the AAPA, Lee, and Watanabe, and further in view of Gowda et al. (U.S. Patent No. 5,898,168, hereinafter "Gowda '168"). Claim 14 is rejected under 35 U.S.C. § 103(a) as being unpatentable over the AAPA, Lee, and Watanabe, and further in view of Gowda et al. (U.S. Patent No. 6,344,877, hereinafter

"Gowda '877"), and claim 18 is rejected under 35 U.S.C. § 103(a) as being unpatentable over the AAPA, Lee, and Watanabe, and further in view of Park et al. (U.S. Patent No. 5,693,967, hereinafter "Park"). Claims 1-4, 6, 12 and 14 have been amended. To the extent that any of these rejections remain applicable to the claims currently pending, the Applicants hereby traverse the rejections, as follows.

In making this rejection, the Office Action admits that the AAPA fails to disclose an analog/digital conversion unit provided for each pair of adjacent photoelectric conversion element columns, and a teaching of a number of photoelectric conversion elements disposed in a plurality of rows and columns in a surface of a semiconductor substrate in the manner set forth in original claim 1. The Office Action states that Lee discloses at col. 5, lines 35-37 and col. 6, lines 46-47, analog/digital conversion on a per-n-column basis. The Office Action further states that Watanabe discloses a number of photoelectric conversion elements disposed in a plurality of rows and columns in a surface of a semiconductor substrate in the manner set forth in original claim 1.

It is respectfully submitted that col. 5, lines 35-37 of Lee are part of the description of the sensor 10 illustrated in Fig. 1 of Lee. As shown in Fig. 1 of Lee, a signal processing block 18 is coupled to a pixel array 12 to receive data output from the pixel array 12. The signal processing block 18 (also referred to as "column signal processing and ADC 18") includes a correlated double sampling (CDS) circuit, a fixed pattern noise (FPN) removal circuit, a programmable gate array (PGA), and an analog to digital converter (ADC). At col. 5, lines 2-37, Lee describes operation of the sensor 10, stating "a transfer signal is applied to all the pixels in the row by a bus... to move

the collected photoelectrons from each of the photodiodes within that row to a sensing node for each of the pixels. . . . The column signal processing and ADC 18 allows the temporary storage in capacitors of the reset and signal levels of each pixel. These signals are then used by an ADC circuit . . .." Thus, with reference to Fig. 1, Lee discloses reading from all of the columns at a same time, and sampling/holding the output from all of the columns at the same time in capacitors or correlated double sampling circuitry.

Col. 6, lines 46-47 of Lee refer to the sensor illustrated in Fig. 4. In describing the operation of the sensor of Fig. 4, Lee states at col. 6, lines 38-47, "Upon being addressed, a row of pixels will strobe the photoelectrons stored therein into the Correlated Double Sampling (CDS) 116 circuits. . . . Fig. 4 illustrates a per-column ADC circuit that detects the signal that is read out of the pixel array via a Correlated Double Sampling circuit 116. The signal is then converted into a digital word by the per-column ADC 118. ADC 118 can perform this conversion either on a single column or a set of columns." As illustrated in Fig. 4, the correlated double sampling circuit 116 is a per-column circuit, so that no information is lost. Thus, with reference to Fig. 4, Lee discloses reading from all of the columns at a same time, and sampling/holding the output from all of the columns at the same time in the Correlated Double Sampling circuits 116.

The Applicants submit that temporarily storing the signal charges of each column of the array in capacitors or a CDS circuit per each column, as disclosed by Lee, enables one A/D converter to convert signal charges in a plurality of columns.

However, if an A/D converter is simply provided per-n-columns and the n-columns supply the charges simultaneously to the A/D converter, the charges will be mixed.

Further, although the Applicants do not agree that such combination is appropriate, even if the n-column ADC of Lee and the pixel interleaved array layout of Watanabe were combined, as proposed by the Examiner, with the conventional MOS image pickup device of the AAPA, the result would not be fit for the intended purpose of the prior art. Combining the n-column ADC disclosed in Lee with the conventional MOS image pickup device of the AAPA would result in the charges supplied to the n-column ADC being mixed. In addition, such combining of both the CDS circuit and n-column ADC of Lee with the conventional pickup device of the AAPA would result in all of the charges for all of the columns being read at a given time. These charges would then be stored in the per-column capacitors or per-column CDS circuit.

The Applicants further respectfully submit that Watanabe discloses reading two rows of the array at a time. Then, every column of Watanabe produces an output at a given time. *See Watanabe at col. 8, lines 26-40, col. 11, lines 9-24, and at Figs. 7 and 12.* If Watanabe were combined with the per-column CDS circuit and n-column ADC of Lee, each column would be connected to an associated per-column CDS circuit.

The Applicants respectfully submit that none of the cited prior art discloses or suggests a solid-state image pickup device that includes at least the combination of a number of photoelectric conversion elements disposed in a plurality of rows and columns, each photoelectric conversion element row including photoelectric conversion elements of only the odd or even columns; a row select signal wiring line provided per each photoelectric conversion element row and extending along a corresponding

photoelectric conversion element row, said row select signal wiring line being connected to and supplying a row select signal to associated switching circuit units of odd or even columns, the row select signal controlling generation of the electric image signal; an analog/digital conversion unit provided for each pair of adjacent photoelectric conversion element columns, and comprising a common sample/hold circuit and a common A/D converter; and an output signal line electrically connecting said analog/digital conversion unit and the output transistors in said each pair of adjacent photoelectric conversion element columns, as recited in claim 1, as amended.

Thus, with the present invention as recited in claim 1, as amended, when any row select signal wiring line supplies a row select signal to its associated photoelectric conversion element row, only the photoelectric conversion elements included in that row receive the signal. Since each photoelectric conversion element row includes only photoelectric conversion elements of the odd or even columns, only the odd columns or the even columns are selected at a time. Since every odd column is adjacent an even column, this means that only one column per pair of adjacent columns is selected at a time. Thus, only one column per pair of adjacent columns generates output at a time, and only one analog/digital conversion unit for each pair of adjacent photoelectric conversion element columns is required, thereby halving the number of analog/digital conversion units that would otherwise be necessary.

Therefore, since none of the cited references, alone or in combination, discloses or suggests the invention as recited in claim 1, as amended, it is respectfully submitted that amended claim 1 is patentably distinct over the combination and in condition for allowance.

As claims 2-18 depend from claim 1, the Applicants submit that these claims are allowable for at least the reasons amended claim 1 is allowable.

Accordingly, favorable reconsideration and withdrawal of the rejection is respectfully requested.

With regard to the rejection under §103 in the Office Action, it is also respectfully submitted that the Examiner has not yet set forth a *prima facie* case of obviousness. The PTO has the burden under §103 to establish a *prima facie* case of obviousness. In re Fine, 5 U.S.P.Q.2nd 1596, 1598 (Fed. Cir. 1988). Both the case law of the Federal Circuit and the PTO itself have made clear that where a modification must be made to the prior art to reject or invalidate a claim under §103, there must be a showing of proper motivation to do so. The mere fact that a prior art reference could arguably be modified to meet the claim is insufficient to establish obviousness. The PTO can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. Id. In order to establish obviousness, there must be a suggestion or motivation in the reference to do so. See also In re Gordon, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984) (prior art could not be turned upside down without motivation to do so); In re Rouffet, 149 F.3d 1350 (Fed. Cir. 1998); In re Dembiczak, 175 F.3d 994 (Fed. Cir. 1999); In re Lee, 277 F.3d 1338 (Fed. Cir. 2002).

In the Office Action, the Examiner merely cites broad general advantages of the prior art (e.g., "The per column (or per set of columns) arrangement allows the conversion of the pixel signals in parallel so that the conversion speed of the ADC is

reduced to the line scan time) so as to render the invention obvious, but such general advantages do not provide the proper motivational basis for combining references so as render obvious the specific claimed features well beyond such general advantages (e.g., "It would have been obvious . . . to employ analog/digital conversion on pairs of adjacent columns as taught by Lee, with the image pickup device of admitted prior art."). See, e.g., Office Action at pages 4-5, 11-12. This is therefore an insufficient showing of motivation.

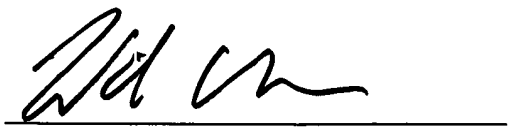
For all of the above reasons, it is respectfully submitted that claims 1-18 are patentably distinct over the cited references and in condition for allowance. Accordingly, reconsideration and withdrawal of the outstanding rejections and issuance of a Notice of Allowance are earnestly solicited.

Should the Examiner determine that any further action is necessary to place this application into better form, the Examiner is invited to contact the undersigned representative at the telephone number listed below.

In the event this paper is not considered to be timely filed, the Applicants hereby petition for an appropriate extension of time. The fee for this extension may

be charged to our Deposit Account No. 01-2300 referencing client matter number **107317-00023**.

Respectfully submitted,



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